

Tobacco Surveillance Report

April, 2008

Interpreting Local Surveillance Data on Smoking Prevalence

The Behavioral Risk Factor Surveillance System (BRFSS) is a collaborative effort between the Centers for Disease Control and Prevention (CDC) and states to monitor selected behaviors and health indicators across the country.¹ It is based on anonymous telephone interviews of adult participants contacted by random-digit dialing. BRFSS was originally developed to provide state-level data but there has been increasing demand for local data.

In 2002, CDC began releasing Selected Metropolitan/Micropolitan Area Risk Trends (SMART) BRFSS prevalence estimates for some topics, including smoking.² SMART BRFSS prevalence estimates are based on Metropolitan/Micropolitan Statistical Areas (MSAs) used by the US Census Bureau since 2003. Micropolitan statistical areas contain at least one urban area of between 10,000 and 49,999 residents; metropolitan statistical areas contain at least one urban area of 50,000 residents or more. To be included in SMART BRFSS reporting, an MSA must have at least 500 completed interviews and must meet certain other numeric criteria in order to provide statistically reliable estimates.

Four areas in Montana were included in the SMART BRFSS reporting for 2006: the Billings Metropolitan Statistical Area (comprised of Yellowstone and Carbon Counties), the Great Falls Metropolitan Statistical Area (Cascade County), the Missoula Metropolitan Statistical Area (Missoula County), and the Kalispell Micropolitan Statistical Area (Flathead County). These areas are named for their major city but county-level estimates may also be available. Only the Billings MSA has SMART BRFSS reports for prior years (2004 and 2005).

The local prevalence estimates provided by SMART BRFSS must be interpreted with caution. The CDC provides the following guidelines:²

- In comparing SMART areas to the state, to each other, or across years, it is necessary to use Confidence Intervals (CI) to interpret the difference between prevalence estimates. A CI reflects the uncertainty around a prevalence estimate. If CIs for two estimates overlap, the estimates should not be interpreted as different, even though they may look quite different.
- SMART sample sizes are too small to support reliable analysis by categories such as sex, age group, race, education, or income. Many behaviors, including smoking, vary by these factors. The populations of SMART geographic units may also vary by these characteristics.
- SMART prevalence estimates are not available if the total number of respondents for a question (denominator) is less than 50. Estimates should be evaluated carefully if the number of respondents in a cell (numerator) is less than 50.
- SMART estimates are not available if the Confidence Interval is greater than ± 10 .

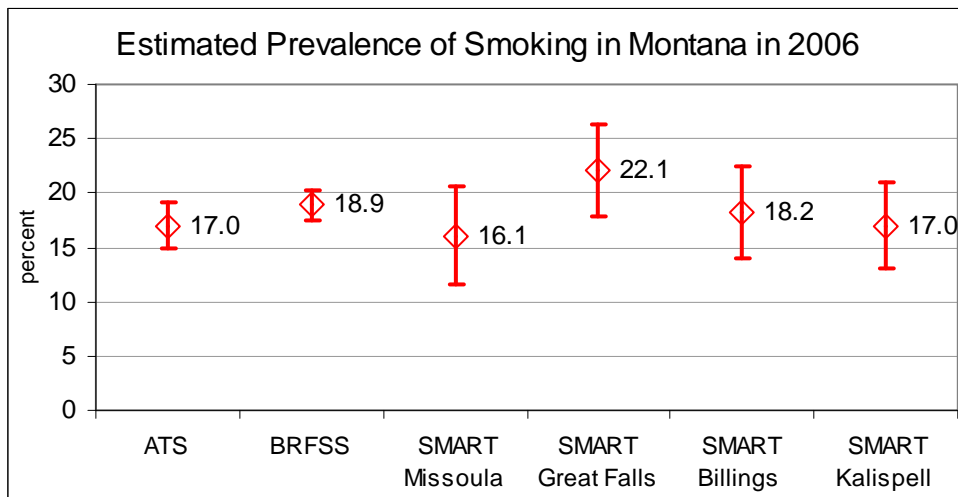
¹ <http://www.cdc.gov/brfss>

² <http://apps.nccd.cdc.gov/brfss-smart/index.asp>

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The table and graph below present estimated smoking prevalence among Montana adults for 2006 from two sources. The first is the Montana Adult Tobacco Survey (ATS), conducted between October and December 2006.³ It is based on a sample of 2,437 Montana adults. The ATS sample was selected and contacted in the same way as the BRFSS sample, although the BRFSS sample was much larger, with approximately 6,000 respondents in 2006. The second set of estimates is from the BRFSS, conducted between January and December 2006, including both the statewide prevalence estimate and the SMART prevalence estimates for four MSAs.

Estimated Prevalence of Smoking in Montana in 2006		
	Prevalence Estimate, %	95% Confidence Interval
Adult Tobacco Survey	17.0	14.9 - 19.1
BRFSS Statewide	18.9	17.5 - 20.3
SMART Billings	18.2	13.8 - 22.5
SMART Great Falls	22.1	17.7 - 26.4
SMART Kalispell	17.0	13.0 - 20.9
SMART Missoula	16.1	11.5 - 20.6



Vertical bars are 95% Confidence Intervals.

Although the prevalence estimates for smoking range from 16.1% to 22.1%, none of the estimates can be interpreted as statistically significantly different from any of the others because all of the CIs (represented by the vertical bars in the graph) overlap.

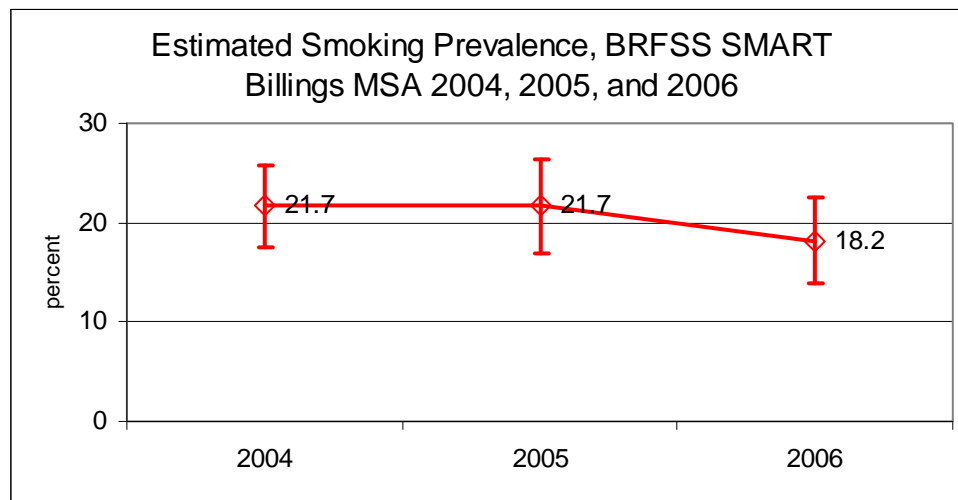
Our surveillance data are based on projecting statewide or regional prevalence estimates from samples of participants whom we hope represent the total population accurately. On the whole, random-digit dialing and a procedure called weighting (assigning each participant a number or statistical weight for analysis to reflect the fact that he or she represents many other similar

³ Montana Adult Tobacco Survey 2006. Montana Tobacco Use Prevention Program, Montana Department of Public Health and Human Services, Helena, August 2007.

individuals based on sex, age, race, and county of residence), results in samples that resemble the state population fairly closely. Nevertheless, there is an element of uncertainty arising from this procedure, measured by the CI around the prevalence estimate. It is conventional to use a 95% CI, indicating that the true value for an estimated prevalence is within that interval with 95% certainty. Other CIs (e.g., 90%, 99%) are used less often.

If the CIs associated with two prevalence estimates overlap, the prevalence estimates should not be described as different. It is common to see descriptions such as "smoking prevalence is lower in community X than elsewhere although the difference does not achieve the .05 level of statistical significance." This may be done in an effort to focus on the apparent difference between two estimates rather than on the likelihood that the difference is real.

The graph below presents three years of data for the Billings MSA from SMART BRFSS. Although the estimates of smoking prevalence decreased from 21.7% to 18.2%, there was in fact no statistically significant time trend because the CIs, indicated by the vertical bars, overlap for all time periods.



Vertical bars are 95% Confidence Intervals.

Sample size is the primary factor determining the width of a CI. In general, the smaller the sample size, the larger the CI. In the example above, based on approximately 500 respondents for each year, the CIs were greater than $\pm 4\%$. It is not feasible to increase MSA sample sizes enough to achieve more precise estimates of local prevalences on an annual basis, but it may be possible in some circumstances to combine two years of data.

The table on the next page shows the effect of sample size on CIs around smoking prevalence estimates in the statewide BRFSS from 1995 to 2006, as the sample increased from approximately 1,200 participants to more than 6,000. None of the estimated prevalences is statistically significantly different from any of the others, in spite of having relatively small CIs throughout the 12 years and very large samples in recent years. Increasing the sample more than five-fold between 1995 and 2006 resulted in a decrease in the CI, from $\pm 2.5\%$ to $\pm 1.4\%$.

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This reflects excellent precision for the statewide BRFSS estimate, but also illustrates the large numbers of participants that would be required to increase the precision of local estimates.

The Effect of Sample Size on the Estimation of Smoking Prevalence Montana BRFSS 1995 to 2006												
	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Sample size	1,192	1,798	1,801	1,801	1,795	3,011	3,330	4,021	4,017	4,987	4,958	6,029
Prevalence Estimate, %	21.2	21.7	20.5	21.4	20.2	18.8	21.9	21.2	20.0	20.4	19.2	18.9
Confidence Interval, \pm %	2.5	2.2	2.0	2.1	2.1	1.8	2.0	1.7	1.7	1.5	1.5	1.4

The difficulty of developing a surveillance system to provide precise local estimates is one of the reasons that the Montana Tobacco Use Prevention Program does not include documenting local changes in tobacco use, knowledge, and beliefs as deliverables from our partners. Rather, we ask local programs to implement evidence-based Best Practices activities of known efficacy that do not require repeated and local evaluation.

Please visit our website at www.tobaccofree.mt.gov

Alternative accessible formats of this document will be provided on request. Please contact 406-444-7408 or infotobaccofree@mt.gov.

For more information about the Montana BRFSS, contact the Montana BRFSS Office, Joanne Oreskovich, PhD, BRFSS Director/Epidemiologist at 406-444-2973, joreskovich@mt.gov, or Susan Cummings, BRFSS Coordinator, 406-444-4111, scummings@mt.gov

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